FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 76 Thursday, August 16, 1945 No. 1513

The Atomic Bomb and Industry

When the news was released of the devastating power of the atomic bomb, people began to think along the lines of the end of the world or the beginning of a new era. We prefer the latter, and are more interested in the immediate results. One is already evident—that of the termination of the war in the Far East. Next is the rendering obsolescent of practically all existing armaments and the machinery necessary for their manufacture, except, of course, a modicum necessary for the effective policing of the sea, air and land. It was, and apparently is, the policy of this country to maintain itself in such state of preparedness that never again should we have to initiate a rearmament campaign after the start of hostilities. Presuming this policy to be unchanged, the physical picture is quite different. The Grand Fleet will be a thing of the past; the Continental armies reduced to a corps of policemen, and the air forces of the world metamorphosed.

Since—and even before—the dawn of the industrial era, an important percentage of the labour force of the world has been engaged on the manufacture of munitions and warlike stores, the quantity varying with the political situation and actual warfare. Throughout this period the search for a weapon which would ensure predominance to the country holding it has ever been uppermost in the minds of the scientific dreamer. The period was characterised by giving full publication and occasionally wealth to the inventor, but little credit to the army of "doers," which made the development a military success. For the atom fission bomb, no single individual gets the credit—instead there is co-operative research, backed by unlimited wealth and the *incentive* of winning a major war. For the future, the public, in general, is "sold" to the idea of scientific research, but where will be the major incentive? It must be remembered that in tropical and sub-tropical and even fairly warm climates, there exists an inherent philosophy based on the premise that once there is an apparent adequacy of food and drink available, there remains no reason for further work. In more Northerly climates more energy is displayed by all classes, based on a desire to be well placed "If Winter Comes." This then must be the fundamental principle of industry—to create a desire amongst a maximum number of individuals for a maximum amount of goods and services which will make for a better standard of living. It is desirable that people should be allowed to enjoy sufficient wealth in order that the work of the artist and craftsmen may find a private market for their wares. We believe that no reliance can be placed on Government and municipal enterprise to get the best out of potential Van Dykes—they have only room for accredited masterpieces.

The steel foundry will undoubtedly be amongst the first to suffer, as War Office and Admiralty contracts were always important—even in peacetime. These departments were also good customers of the heavy bronze foundries. As for the ironfoundries, they will have to forgo but a slight percentage of the overall production, but, nevertheless, important for certain concerns. The light alloy foundries were finding an ever-increasing use for their products in all three fighting Services, but apart from the Air Force, the proportion in peacetime was not great. Among the great changes which peace may bring about—unless properly directed—is insensate competition. When firms are forced into new productions, this obvious gamble sometimes embraces taking a chance on low selling prices in order to get a foothold in the new market. This will cause a price war, for which no "stopper," such as an atomic bomb, has yet been found.

Contents

The Atomic Bomb and History, 317.—Book Reviews, 318.—Initial Experience in Hydraulic Cleaning in a Steel Foundry Fettling Shop, 319.—An Investigation of the Constitution of Certain Foundry Bonding Clays, 325.—Excess Profits Tax, 328.—Home Consumption of Lead, 328.—Metallurgical Applications of Graphite, 328.—News in Brief, 330.—Eire Scrap-iron Order, 330.—Personal, 332.—Workers and the Government, 332.—New Trade Marks, 334.—New Companies, 334.—Obituary, 334.—Raw Materials Markets, 336.—Death of Sir Allan Macdiarmid, 336.—New Patents, 336.

BOOK REVIEWS

"Aluminum—An Industrial Marketing Appraisal." By N. H. Engle; H. E. Gregory and R. Mossé. Prepared with the co-operation of the United States Department of Commerce and the Washington State Planning Council, and published by Richard D. Irwin, Inc., Chicago. Price $6.

This monumental study of the American aluminium industry ought to include a summary, as the reviewer found the expression of so many views by so many important people a little bewildering. Yet the industry of which it treats is in itself of that nature. It has grown from a production of 156,000 metric tons in 1935 to 6,373,000 in 1943. In the latter year the apparent consumption was 4,860,000 tons, leaving an unused surplus of 1,513,000, or more than the world's production of 1934! Here then, shortly stated, is the problem. The U.S. Government have, in order to beat Germany and Japan to their knees, created an oversized aluminium industry capable of making much more aluminium than that country, or, indeed, the world, can use.

The authors have carefully and logically set out six policies for dealing with this excess capacity; dismantling; retention as stand-by plants for times of national emergency; sale by auction; retain and exploit commercially; lease for private exploitation or mix up the previous suggestions. The authors have used the chapter to study this all-important problem, relying on the first 18 to provide the background for their deductions. This has been very thoroughly undertaken. An amazing wealth of statistics has been drawn upon as well as the views of a not inconsiderable number of statesmen, politicians, and business men (including foundry owners).

A really helpful attempt has been made to list every possible article that could be made of aluminium —with the virgin metal at 10 and 15 cents a lb. The book reviews very intelligently the competition from steel, vitreous enamel ware, magnesium and plastics. No facit has been left unexposed. It is not the destiny of America's surplus reduction plants and rolling mills which will interest the British reader so much as the vast preamble leading up to the crucial situation.

V. C. F.

"Iron Alloys Technology." (In Polish). By Stanislaw T. Jazwinski, Dipl.-Ing. Met. Published by the Polish Ministry of Education, London, 1945. Price 22s.

This book, written in the Polish language, has a twofold value. First, it materially enriches Polish literature; secondly, it is one of the obvious proofs of the help and understanding which the Polish technicians have invariably received in this country. The evidence of help is obvious in the illustrations made available by many British firms and institutes. The photographs of numerous examples of microstructure were provided by the British Cast Iron Research Association. This feature is noticeable to a Polish reader, who had been accustomed to see in his standard text books, a wealth of illustration from German practice. The book covers a very wide field. In the introduction, the author stresses the necessity for the knowledge of physical-chemistry to a metallurgist and gives a very brief summary of the fundamental laws of the subject. Chapter I deals with the iron-carbon diagram, which in the author's words "is the A.B.C. to the full understanding of the most metallurgical processes."

The next three chapters give the properties and structures of the three main alloys of iron, *i.e.*, cast iron, malleable cast iron, and steel, using well-chosen graphs and standard data. Then follow the chapters covering the manufacture processes, describing the crucible furnace, blast furnaces, cupola, converter, open-hearth furnace, rotary furnace, electric-arc and high-frequency furnaces. The book closes with a concise review and characteristics of the refractory materials used in metallurgical processes.

The subjects of most interest to a foundryman are treated favourably and have been given a fair share of the 238 pages of the book. On the operation of the cupola some useful practical data are included. In the basic electric process the author draws attention to the influence of a good boil and backs the argument by an example from the practice. C. M. STOCH.

"American Malleable Iron—A Handbook." Published by the Malleable Founders' Society, Cleveland, Ohio. Price $4.

The object of this well-produced book is to interest the designers and the engineers' buyers. Hence the more abstruse technicalities are absent, whilst such factors as machinability and good design are emphasised. Using photography to good effect, the onerous services to which malleable castings are put are well brought home to the reader. The book opens with a short account of the historical development of the industry in the U.S.A., but returns to the subject in Section XV. Here we learn that it was not Réaumur who invented malleable cast iron, but David Ramsey. His patent, which does not seem to have been exploited commercially, was dated 1630, as against Réaumur's well-authenticated publications of 1720-1722. These are so clear as to retain for the French savant for all time the title of the "father of the malleable industry."

Nearly half of the book—from page 223-367—is taken up with appendices, engineering tables and an excellent index. The tables have perhaps been a little over-elaborated, and the inclusion of the specific gravity of piled potatoes and the properties of popular stainless steels savour of padding. Actually designers possess most of this type of material in specialised publications, and its inclusion does not greatly enhance the value of the book. Despite the small criticisms, the Malleable Founders' Society is to be congratulated on the way they have dressed their shop window. It is an example which should be emulated by United Kingdom manufacturers.

V. C. F.

WATERVLIET ARSENAL has cast some 40,000 parts by the investment process since its introduction a few years ago. They weigh from 1 oz. to ¾ lb.

INITIAL EXPERIENCE IN HYDRAULIC CLEANING IN A STEEL FOUNDRY FETTLING SHOP

Wartime developments of a process widely used in America

By F. N. LLOYD (Member)

(*Continued from page* 303.)

Fig. 10 illustrates the sand dewatering tank, and the sludge tank (Figs. 11 and 12) is similar, except that it is rather smaller, and the sludge is conveyed to it by means of a flume, instead of a rubber delivery pipe. In the tank is fitted a pin type chain, and, at every sixth link, slats are fitted to drag the sludge from the tank bottom. These slats, on leaving the water, pass along a chute, allowing the surplus water to flow back into the tank. The chain travel is about 2 ft. per min., and is driven by a roller chain through a 2-h.p. geared motor.

A scraper is fitted at the discharge end of the chain, to scrape the sludge from the slats. This is fitted with springs to return the scraper to the correct position. The sludge is scraped off and falls down an inclined chute into a skip. The sand which comes out of the bottom of the classifiers flows into the blast-sand storage tank, from which the guns are supplied, and, once this tank is full, any excess sand goes on to the sand transfer tank, from which it is pumped, by an identical pump to that below the room, to the sand dewatering tank. The general arrangement of this is identical to the sludge removal tank, previously described.

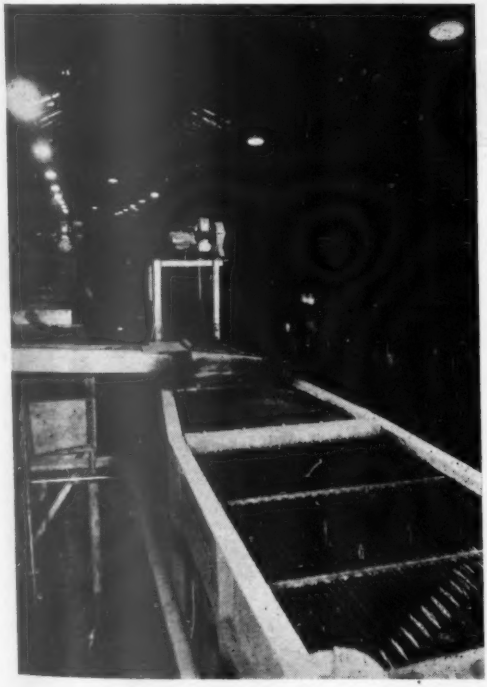


FIG. 11.—SLUDGE TANK SHOWING WEIRS AND CONVEYOR.

The sand feeder for the guns is fitted at the bottom of the blast sand tank, and consists of an outer tube, intermediate and centre tube. The outer tube receives the sand and water through holes arranged in the circumference, which then passes through further holes in the bottom section to the centre tube, where it is drawn into the gun by vacuum carried by the velocity of the high-pressure water. The intermediate tube is connected to the 40-lb. per sq. in. water line, which destroys the vacuum and prevents sand from entering the feeder when water only is required through the gun. By this means, when a casting has had all the loose sand removed, it can be washed down with clean water. The change over from sand and water to water only is controlled by the operator, through a valve operated from the room.

The gun (Fig. 13) is easily handled by the operator, and weighs about 8 lbs. It consists of an outer aluminium case in halves bolted together, and fitting around the gun body proper, which consists of body, water connector, internal jets, tungsten carbide nozzle, and nozzle retainer and hose spud. A brass swivel with graphite packing is fitted into the water connector and a similar swivel on the steel high-pressure pipe in the room, to facilitate easy manipulation of the gun. The tungsten carbide nozzle is easily replaceable.

The gun passes 25 galls. of water and 70 lbs. of sand per min., or a total of 320 lbs. of solution, at a velocity of over 3 miles per min., or 264 ft. per sec. The back pressure is 30 to 35 lbs. when passing 25 galls. per min., at 1,250 lbs. per sq. in. pressure.

OPERATION OF PLANT

The castings, a typical illustration of which is shown in Fig. 14, are placed in the Hydro-Blast room almost exactly as they come from the foundry. If any large flashes have got behind the core prints, it is necessary to remove these. Otherwise, no preparation is necessary, and the more sand there is adhering to the casting, the more sand is reclaimed for use in the foundry. Incidentally, the sand-handling capacity of the plant, which is rated at 5 tons per hr., has been found to be

Initial Experience in Hydraulic Cleaning

well in excess of the amount of sand which it is practicable to bring to the plant under present conditions, and it will be appreciated that, to feed 5 tons of sand

FIG. 12.—SAND AND SLUDGE DEWATERING TANKS, WITH TIPPING TRUCKS FOR REMOVAL OF SAND AND SLUDGE.

an hour to a plant operating day and night is not easy, and the quantity actually represents considerably more sand than is consumed in the whole foundry.

The positioning of the casting in the room is most important. The cores cannot be completely washed out unless the displaced sand is able to flow out of the casting, along with the surplus water. The best position for the casting is found to be inclined at an angle of about 20 deg. from the vertical, and most castings have to be re-positioned to enable the operator to reach all parts of the casting.

In this respect, it will be found that the efficiency with which the crane service is organised has a big bearing on the output of the plant. Everything depends on the teamwork of the operators and the crane driver to see that the plant is kept operating as continuously as possible, and that the time taken for re-positioning is reduced to a minimum. Figs. 15 to 17 show the stages in the process of cleaning a casting.

The clothing worn by the operator consists of rubber wellingtons, a suit of trousers, which reach down to well below the knees, of a material specially designed for the purpose, a jacket, helmet and gloves. It is found, in practice, that the clothing is completely watertight, provided it is kept in proper condition. It is desirable that each operator should have his own suit, and not share a suit with another operator.

There is a liberal supply of clean air to the operator's helmet, and this circulates inside the operator's suit and eliminates all humidity inside the clothes, so that no discomfort from inside condensation on the rubber suiting is experienced. The Author's personal opinion is that the operating conditions on the Hydro-Blast plant are substantially better than those for operators working inside shot-blast rooms. The air supply is provided by a blower, which has a capacity of 28 cub. ft. of air per min., at a pressure of 5 lbs. per sq. in., and this supplies two helmets. The air passes through a filter to remove any oil or water before reaching the helmet. The blower runs at 2,900 r.p.m., and is direct coupled to a 2-h.p. motor.

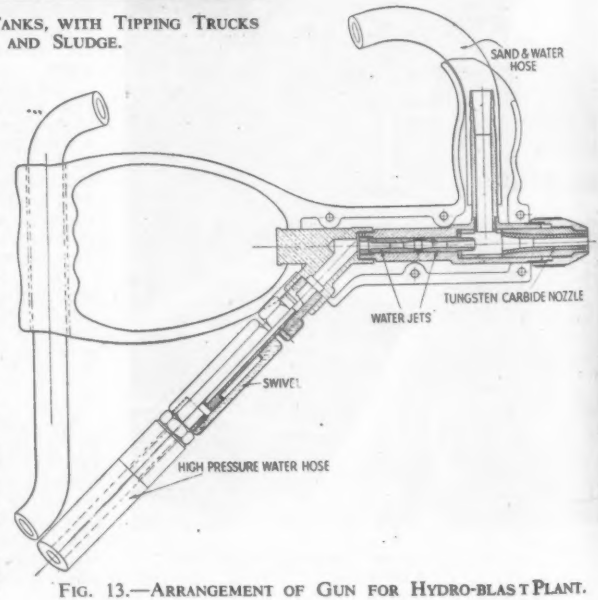


FIG. 13.—ARRANGEMENT OF GUN FOR HYDRO-BLAST PLANT.

Quantities of sand and water are often washed back over the glass protecting the operator's eyes, and this has the effect of completely obscuring his vision for a time. This is cleared periodically by a flush of water, as explained below, so that, when the operator has had his vision obscured in this way, he has to wait for the next flush of water before he can again get a sight of what he is doing. In this respect, skill and experience in the operator come in, in so directing his gun that the sand and water are not washed back over his helmet, and also in being able to keep his gun directed on the part of the casting where it will clean effectively when his vision has been obscured. The visor of the helmet is fitted with two glass panes, one, ordinary glass at the front, and the back pane of non-splinterable glass. Water is brought to the helmet from the 40-lb. line through rubber hose to a perforated pipe at the top of the visor. The glass is washed with this water every 7½ secs. for 2½ secs. This is carried out by means of a time switch, which operates a magnetic valve controlling the supply.

The gun itself is much easier to hold than would be expected, and is nowhere near so unmanageable as a fireman's hose. This is because, although the water is operating at a pressure of 1,250 lbs. per sq. in., the quantity of water passing per minute is only 25 galls., and it is the quantity of water passing per minute which determines the amount of effort required to hold the gun. The skill of the operator also comes in in directing the gun so that the sand which has been removed is washed away, and does not prevent the full velocity of the water jet on the parts of the casting which have not yet been cleaned. The best cleaning results are obtained by applying the jet at an angle of about 30 deg. to the surface being cleaned. If the sand is adhering to the casting, direct impingement of the jet is necessary to remove it, and the time of impingement depends on the degree of adherence.

The Hydro-Blast is capable of completely cleaning any casting, but, in cases of very hard adhering sand, it is quicker to do so by pneumatic chisel than with the Hydro-Blast plant. Moreover, as it is essential that the Hydro-Blast shall keep pace with the output of castings from the foundry, it is not desirable to attempt to remove all hardly adhering sand by the plant, and it is found best to concentrate mainly on removal of surplus and non-adhering sand by the Hydro-Blast plant, and not to

FIG. 14.—CASTINGS BEFORE CLEANING.

FIG. 15.—VIEW OF CASTING IN ROOM PARTLY CLEANED.

clean castings completely, if this has the effect of creating a bottleneck in the fettling shop production. A changing room for the operators forms part of the installation.

The above remarks deal mainly with experience on this particular installation, and it is thought that cleaning experience of castings other than steel will be a very much easier matter.

SAND RECLAMATION

(1) Previous Sand Reclamation Experience

The ideal of sand reclamation is to eliminate the use of new sand altogether. The extent to which this ideal is realisable depends upon whether the sand which has come into close contact with the metal is still in a condition where it is suitable for further use. In actual practice, many other factors, apart from damage to the actual sand grains by the metal temperature, affect sand reclamation, so that, in most foundries, substantially larger quantities of new sand have to be used than should be necessary, assuming this ideal to be attainable.

FIG. 16.—CASTING AFTER CLEANING.

In the foundry under consideration in this Paper, sand reclamation was carried, prior to the Hydro-Blast installation, as far as considerations of maintaining the stripping and other qualities of the castings up to the requisite level allowed. The sand reclamation procedure consisted of magnetic separation, followed by screening in a rotary type screen, which served the combined purpose of breaking up aggregates of sand and eliminating oversize material. A certain amount of dust was removed from the top of the screen by exhaust. This was more with the object of minimising the dust hazard in the sand conditioning plant than that of eliminating fines or burnt clay from the sand, though this object was undoubtedly achieved to a certain extent. The Author is of the opinion that none of the methods of removing fines and burnt clay by air separation methods, however well devised, can be really effective, as the burnt clay is usually adhering to the sand grains with greater strength than any form of air suction can remove. Although the method of fines removal previously adopted is open to improvement, the Author feels doubtful as to whether the capital expenditure involved would be justified, and whether this would enable an appreciably larger proportion of reclaimed sand to be used without detriment to the stripping qualities of the castings.

The amount of reclaimed sand which is usable depends on the type of castings being made, and the limiting factor seems to be that the residual clay bond in the reclaimed sand, while being less effective as a bonding agent, requires the same amount of water to saturate it, and new clay has to be added to make up for the weakness of the residual clay. Therefore the total amount of tempering water required with reclaimed sand mixtures is greater than with sand mixtures made from entirely new sand. The bulk of the castings made is greensand or skin dried, and the controlling of the moisture content of the sand down to the minimum level determines the type of castings which can be made in a given sand mixture without sacrifice of quality.

Another detriment to the use of reclaimed sand is that the permeability is less, so that the steam arising from the evaporation of the water in the sand at the time of casting is less easily able to escape backwards through the mould, and is more likely to escape through the mould face, where it can cause trouble in casting. Moreover, the stripping qualities of the casting are progressively lowered in proportion to the increase in the amount of reclaimed sand used, and this, again, is thought to be due to a tendency for the clay adhering to the reclaimed sand to fuse and form voids, thus initiating a process of metal penetration, which results in a form of sand adherence very hard to remove in the fettling shop. It would seem, therefore, that the extent of sand reclamation adopted must represent a compromise between sand costs and fettling shop costs, and the Author has found that it pays, on the whole, to use facing mixtures which are as easy to clean as possible, even if it is necessary to incur considerable additional costs of moulding materials.

(2) **Sand Practice in Use**

In the whole foundry, the type of sand practice in use is dry sand for heavy castings, skin drying for

FIG. 17.—CASTING AFTER CLEANING.

medium castings, and greensand for light castings. All the castings which are the subject of cleaning by the Hydro-Blast in the heavy foundry are either dry sand or skin dried. The sand practice, generally, is based on the use of two silica sands from the Leighton Buzzard deposits, *viz.*, Garside 6CW and Arnolds' 26A. These sands are mixed in varying proportions, according to the metal thickness of the castings.

The bonding clays used are bentonite, and other clays which have had to be utilised under wartime conditions. Of all the clays experienced, bentonite has been found to be far superior as regards the absence of difficulties encountered due to clay accumulations in the reclaimed sand. The short supply of bentonite, under wartime conditions, has caused great difficulty in maintaining casting quality, and has, in practice, resulted in lower proportions of reclaimed sand having to be utilised to enable casting quality to be maintained at the requisite level. It should be borne in mind that the remarks on sand reclamation here are based on this particular sand practice as applied to steel castings.

(3) **Sand Processing in the Hydro-Blast**

The actual processing of the sand in the Hydro-Blast plant is as follows:—

The Hydro-Blast gun, which is directed on the sand adhering to the castings, only actually comes in contact with a proportion of the total amount of sand passing through the system. This proportion is hard to determine, and it depends, naturally, upon the amount of sand which is adhering to the castings which are put into the Hydro-Blast room. A proportion of the sand, which, again, is hard to determine, as it varies with operating conditions, passes through the Hydro-Blast gun. The amount of this sand can be measured, as the sand is known to pass through the gun at the rate of 70 lbs. per min. while the gun in operating. It is obvious, however, that the proportion of the total amount of sand passing through the plant which passes through the gun will be very much a variable quantity.

The whole of the sand going through the process, whether it passes through the gun or is subjected to the impact of the gun, is washed through the grating in the room, and falls over the vibrating screen, where the oversize material is removed. It is found that the greater part of the oversize removal consists of rubbish, and that only a small amount of usable sand is lost in the form of lumpy aggregates, as these seem to be fairly well broken down before they reach the vibrating screen.

So far as the processing effect on the sand is concerned, the Hydro-Blast operation amounts to a wetting and fairly intense washing and scrubbing process. The effect of it can be seen by examination of the micro-photographs (Figs. 18 *et seq.*), which show (1) (*a*) and (*b*) the two new sands which form the basis of the sand mixtures in use; (2) sand from the face of the casting before Hydro-Blasting; (3) reclaimed Hydro-

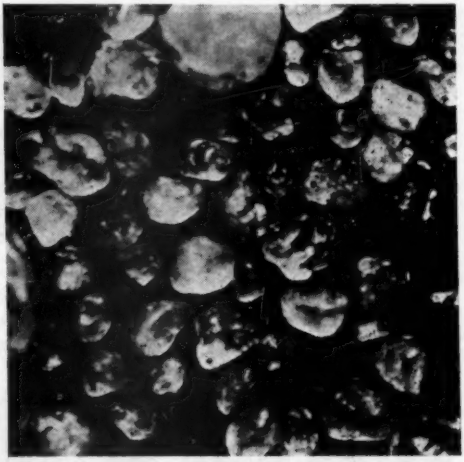


FIG. 18A.—GARSIDE 6CW. REFLECTED LIGHT. BLACK GROUND. × 15.

Initial Experience in Hydraulic Cleaning

Blast sand; and (4) foundry knock-out sand reclaimed by the existing sand-conditioning methods, involving magnetic separation, screening and dust exhaust.

The effectiveness of the washing and cleaning process for sand reclamation is shown by comparison between Figs. 29 and 21.

The Hydro-Blast operation appears to remove all adhering clay on the sand grains, but the sand, as reclaimed from the Hydro-Blast, retains a dark colouring, which is due to the carbonising of organic bonding materials, such as cereals, starches, dextrin and core oils. Removal of the clay, however, seems to be complete, and the sand, as reclaimed, has no residual bond, and, when agitated with water, an entirely clear solution results, the sand settling immediately to the bottom of the flask when the agitation has ceased.

(*To be continued.*)

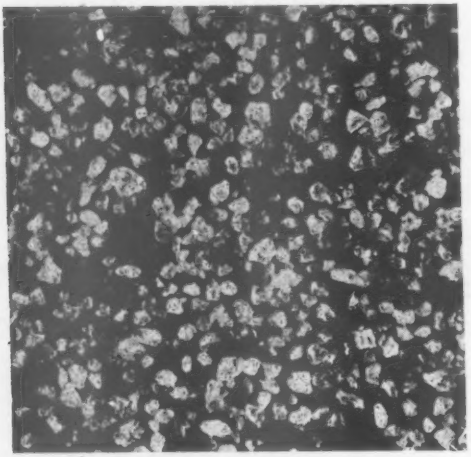


FIG. 18B.—ARNOLDS 26A. REFLECTED LIGHT. BLACK GROUND. × 15.

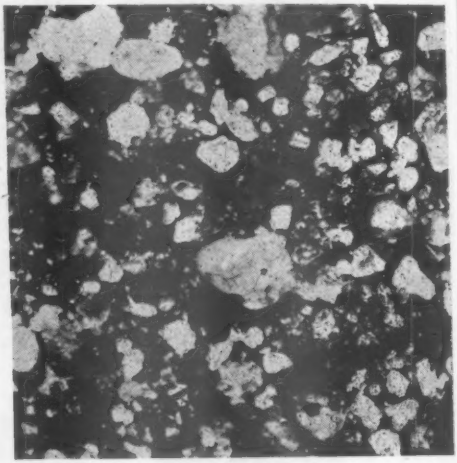


FIG. 20.—HYDRO-BLAST SAND. REFLECTED LIGHT. BLACK GROUND. × 15.

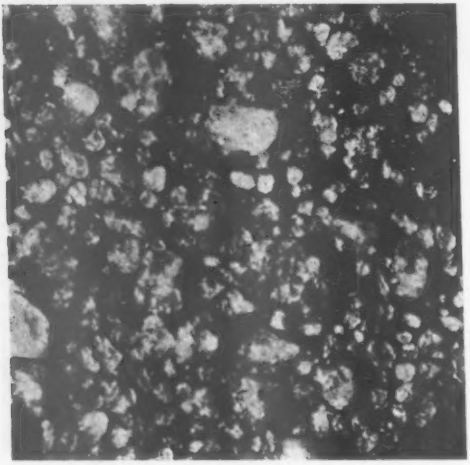


FIG. 19.—FACE OF SAND FROM CASTING. REFLECTED LIGHT. BLACK GROUND. × 15.

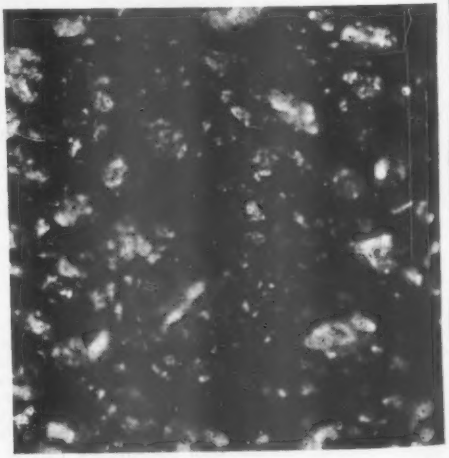


FIG. 21.—RETURNS. REFLECTED LIGHT. × 15.

AN INVESTIGATION OF THE CONSTITUTION OF CERTAIN FOUNDRY BONDING CLAYS

An approach to a true synthetic bond

By R. W. GRIMSHAW, B.Sc., and A. L. ROBERTS, Ph.D.

Discussion on a Paper read at the annual meeting of the Institute of British Foundrymen. The Paper was printed in our issue of July 19.

DR. J. E. HURST (past-president) said that one of the objects of the work undertaken by the Authors at Leeds was to identify the mineralogical characteristics of Colbond. The older metallurgists and foundry chemists had known for a long time that the plastic properties or the bonding properties of clay were intimately associated with the mineralogical characteristics of the clay, and particularly in the early days, they must have been very dissatisfied in being able merely to analyse clays chemically and to report only the chemical constitution. Dr. Roberts and his colleagues at Leeds had devised their very commendable method of identifying these mineralogical characteristics of clay, and in presenting the Paper they hoped the method would be appreciated by metallurgists. Their method bore a very close resemblance to the metallurgical method of examining metallic alloys by finding inflections in the cooling curves and disclosing critical points. As such it was a method which was not entirely beyond the capabilities of the ordinary metallurgical laboratory; it was a method which enabled the determination of clay constituents without using some of the newer physical instruments such as X-ray diffraction apparatus. It really did give a positive determination of the mineralogical characteristics of the clay.

Characteristics of Bentonite

It was a matter of considerable interest to foundry people because the importance of bonding clays was well recognised, and the important characteristics of bentonite, which was of definite mineralogical character, were appreciated. To be certain beyond a shadow of doubt as to whether a plastic clay which was discovered at any time did contain any of the bentonite mineral montmorillonite was a question of very great interest to foundry laboratories. Already in the kaolinite clays a number of mineralogical varieties had been identified. Halloysite was one of them, and it was equally important to be able to ascertain which, if any, of these varieties of kaolinite were present in any clay that was under examination. The Authors were very anxious that the metallurgist should feel that they had disclosed a method of examination of clays which would be of value.

MR. T. T. SHEEHAN, congratulating the Authors on the presentation of a unique Paper, said it provided another tool in the foundry in that it provided a method of evaluating something which was previously rather obscure. Founders had talked very loosely of "synthetic sands," a convenient expression, but those sands were not truly synthetic; they were rather artificially-bonded sands, and he believed we were getting nearer to what he would call a synthetic bond. He would like the Paper to be followed—and possibly it would be—by the creation from British natural resources of something equivalent to a synthetic clay. In view of the fact that it had been shown in the Paper that there was a definite relationship between the ratio of aluminium oxide to silica and the plasticity of the clays, he felt that the work might be extended to the synthesis of clay materials. In an emergency such as that through which the nation had recently passed, during which it had had to import a certain amount of bentonite from overseas, if foundrymen could get down to the synthesis of a clay of high plasticity combined with high refractoriness, it would represent a big step forward in the foundry industry.

At the same time, whilst it was stressed that the montmorillonite type gave a high plasticity, flowability was also a very desirable property, in that one required a sand to flow readily around the pattern in order to give an accurate mould. After all, an accurate mould was the beginning of all foundry technique. If foundrymen could get a bonding material or sand with high refractoriness and high flowability, they could from the mechanical point of view develop sufficient power in the moulding machine to give an accurate mould of high strength. A plastic mould was very dangerous. If it were plastic when it was made, it gave a good lift, which aided a lazy moulder, but produced a casting which was not accurate.

The Paper had yielded much new knowledge, and foundrymen should be able to select a bonding material which would give a balanced mixture. Given the higher refractoriness of the kaolinite and halloysite types, with the added plasticity of the montmorillonite types of clay, the founder would do the rest. There might be a development of hydraulic moulding machines, which would make a rigid mould. Plasticity was not a measure of the value of a sand; it was a measure of the ease with which one could make a mould, or a measure of the laziness of the moulder. It was only as the result of Papers such as that of Mr. Grimshaw and Dr. Roberts that one could get a good mental picture of the requirements of a moulding sand. He was grateful to them for the thought they had put into it.

Foundry Bonding Clays

American Practice

MR. HUNTER asked if the Authors had considered plasticity in relation to moisture content, because the Americans were using a sand of very low moisture content. He believed that in many cases they were using sands having moisture contents of 3 per cent. and less; that was something that one could produce here only in a more or less experimental way, using synthetic bonding materials. The Authors' theories regarding the formation of the various minerals might have a very big bearing on the point. Referring to the method of thermal analysis described, he asked if they had experienced any difficulty when the sand contained carbonaceous matter. Did the carbonaceous matter have an effect on the measurement of the minerals present?

MR. T. HENRY TURNER, M.Sc., asked why the Authors had finished their curves at 1,000 deg. C. In the laboratory tests, did they rely on manual recording or was automatic recording necessary? He assumed that their assistant had taken observations and had recorded them manually during the period of 60 min. required. If one followed the heating curve with a cooling curve, was it a straight line? The indications of endothermic reactions near the 1,000 deg. C. end of the Authors' curves and the fact that molten bronzes or ferrous-alloys would heat sand above that temperature, suggested that tests should be made at higher temperatures. The Authors' method appeared novel and capable of application to still further problems.

MR. D. SHARPE (past-president), pointing out that the moisture content of a mixture was a very important factor, said that mixtures having a moisture content between 2½ and 3 per cent. were being used in this country regularly every day of the week. If that moisture content were altered, the result was to upset the bond of the mixture so completely that trouble was experienced.

MR. A. TIPPER, M.Sc. (Eng.) emphasised the value of giving the industry all the information possible as to the method of studying clays, not merely from the point of view of examining new materials, but also from that of checking supplies of what one hoped were standard materials. He could not quite follow the argument that the first loop in the curve was definitely related to the adsorbed water, because it was not obvious that bentonite was any better than some of the other clays, though it was known that it had a very much higher water adsorption value.

With regard to the work on rehydration, some work he had previously published on this subject suggested that it should be carried through at higher temperatures in order to approach the conditions that occurred near the face of the mould. By heating repeatedly the same sample to higher temperatures one might be able to differentiate between different types of mineral, and evaluate the "life" of the bond in service. As to the examination of Colbond, he commented on its high content of quartz, and said that obviously this suggested a possible way of effecting improvement. Finally, he thanked the Authors for their very simple and straightforward statement of the facts.

Authors' Reply

DR. ROBERTS, replying to the discussion, said that Mr. Grimshaw and himself appreciated its constructive nature. Commenting on Dr. Hurst's admirable description of the implications of the work, he said it was only fair to mention that the principle of thermal analysis had been known, as Dr. Hurst had pointed out, in connection with metallurgical work for a number of years; indeed, the famous Le Chatelier had first used it in 1887, and had laid the foundations of thermal analysis in examining the clays. But it was a very simple arrangement which could not be relied upon to give the information that was given by the method described in the Paper. Rather than devise a new principle, the Authors had improved the details—at any rate, he believed they could justifiably claim to have done that—and had developed the method into something which gave a broad identification, a positive identification, and allowed one to analyse the mineral components with some degree of quantitative precision. That particular technique had required about four years to work out, and its development was not yet completed; there were all sorts of difficulties in it, which had had to be eliminated one by one. But a stage had been reached at which most of them had been eliminated, so that they had felt that it was safe to present the results so far obtained. Possibly very shortly the technique would be even better.

A very original note had been struck by Mr. Sheehan in his reference to synthetic clays, and his suggestion was an excellent one. But the development of synthetic plastic materials seemed to depend first on knowing what minerals were needed in the synthetic material; there were now means of knowing that, once one had worked out exactly what were the plastic and other appropriate properties of each of the types of clay materials. That was a difficult matter, because pure samples of the different types of clay mineral were extremely rare, and the work which he and his colleagues had done from that angle was hampered to a very considerable extent by the lack of suitably pure samples of minerals. In fact, they were having to extract it by elutriation and separation in very fine fractions, and the yield was so small that it would take weeks or months, unless they could get some valuable apparatus, to obtain sufficient quantities for bulk tests. But that would come in due course.

The second stage of the problem was to know how to make it. Strangely enough, the synthesis of clay minerals had received a certain amount of study, and there was a good deal of valuable information ready for use when requirements were postulated. He agreed with Mr. Sheehan that the prospects of synthesising a clay to give the properties required was by no means ridiculous. Long-term work might be necessary; it might require years of work, but he believed it would

come in due course. All who had experience of foundry sands would agree fully with Mr. Sheehan's remarks on plasticity, which by itself was not enough; it was necessary to balance one advantage of a particular clay mineral against another, and so to obtain a balanced product.

The remarks of Mr. Sheehan and Mr. Hunter indicated the general problem which confronted the Authors in the foundry application, and also in the broader field of the examination of clays used as raw materials in other industries. One must isolate all the different types of minerals in as pure a state as possible, and determine their individual properties; then one would know what one wanted and how to combine them to produce the clay that was needed.

In reply to Mr. Hunter, he said they had not investigated the plasticity in relation to moisture content in the minerals, mainly because they had not sufficient of them available, except possibly kaolinite, which was not sufficiently interesting. It was weak in any case. He believed that in such tests as they had made, quite adequate green strength values were obtained with many of the bond clays of the fireclay type having moisture contents of less than 3 per cent. Mr. Grimshaw thought there was a peak generally at a maximum of about 3 per cent. moisture.

In the case of the clays mentioned by Mr. Sharpe, it would be very interesting to examine the clay fractions of the particular sands which gave strength with low moisture content. There again the precise nature of the mineral in those clays would enter into the problem—how its strength varied with moisture content.

Presence of Combustible Matter

As to the effect of combustible matter on thermal analysis, Mr. Hunter had touched on the worst drawback in thermal analysis. If there were much combustible matter present, the thermal curves would go "haywire"; there was a strong exothermic peak and heat evolution. In such cases the clay had to be treated chemically in order to destroy the organic matter before it was tested thermally. There were many methods of doing that, some of which worked very well; but if there were coaly matter or bitumen present, very often the methods did not work, as one could not eliminate the last traces of organic matter. However, by successive such treatments, and by making a number of comparisons, one could even so identify and possibly estimate the minerals. It was a serious drawback, but not necessarily overwhelming.

Dealing with Mr. Turner's question as to why the thermal curves finished at 1,000 deg. C., he said that the bulk of the thermal effects in which they were interested at present occurred at temperatures below the temperature. They were aware, of course, that thermal effects occurred at higher temperatures; they were making provision for building thermal analysis apparatus, complete with the necessary platinum wire furnaces, and he hoped the results would be available in due course. But at temperatures above 1,000 deg. C. one came into the range in which reactions between clay constituents started, and the problem became very complex. It was nothing like so simple above 1,000 deg. C., as it was below that temperature.

Differential Temperature

The differential temperature, *i.e.*, the temperature difference between the sample under test and the inert material heated side by side with it, which was the basis of the thermal analysis method, was recorded automatically. At the same time, the temperature of the inert material itself, *i.e.*, the rate of rise of temperature with time, was recorded manually, because one had to cater for a variation from room temperature to 1,000 deg. C., and a recorder which was used for recording temperature differences of 10, 20 or 30 deg. was not suitable for that work. The American practice was to record everything automatically nowadays. It was very nice from the routine control point of view; but for research purposes he and his colleagues did not approve of that, because it meant depending on the reliability of the recording instruments, and in their experience that could not be taken for granted.

With regard to the cooling curve, having ascertained that Mr. Turner had in mind that when one repeated the test the thermal effects were eliminated and one obtained a horizontal straight line, he said that that was the case. He pointed out that the curves as presented in the Paper were not the actual recorded curves; the recorded curves were subjected to certain corrections, and when the corrections were applied, then on the second run-up, after the first test had eliminated the thermal effects, one obtained a straight line, or practically a straight line.

Replying to Mr. Tipper, Dr. Roberts said that the first peak in the bentonite curve was curtailed. The bentonite actually gave 90 deg. cooling, which was an extrapolated value, because it ran off the temperature recorder. The peak "a" depended on the original moisture content in the clay. Usually it was necessary to dry out the bentonite type in order to keep the curve on the recorder; otherwise it would shoot right off. That was quite characteristic of bentonite.

Rehydration Tests

The suggestion made by Mr. Tipper with regard to rehydration tests was a good one; the Authors had not tried the effect of rehydration after the clay had been heated to successively higher temperatures. They just standardised on 30 deg. as the pre-heating temperature, and measured the rehydration afterwards. Heating to higher temperatures and studying the rehydration might be a method of differentiating between the different types of mineral.

The high proportion of quartz found in Colbond was extremely interesting. The Authors had known that the main impurity was quartz, but they had not known that it contained so much. Since they had discovered that they had examined a considerable number of fireclay types of materials which showed proportions of the same order; 30 per cent. was quite common in fireclays occurring in the Yorkshire area, the siliceous types of clay. There was the possibility

(*Continued overleaf, column* 2.)

EXCESS PROFITS TAX

PRESENT POSITION OUTLINED

By F. J. Tebbutt

With more concessions in the Excess Profits Tax provisions by the Finance Act, 1945, this article gives in brief form the position as regards this tax up to date. The tax is roughly the excess in current profits (100 per cent.) over those pre-war, these being called "standard profits"; these may be actual profits in specified yearly periods (the taxpayer has certain options in respect to years), thus called "the profits standard," or for newer businesses a sum based on capital used, the "capital standard," or where the firm was having a lean time in a specified period with little or no profits a sum other than actual profits called a "substituted standard," or an amount can apply arrived at through the "minimum amount" provisions, which really means that if current profits do not reach that sum the taxpayer is exempt from tax paying.

By earlier Acts, the "minimum amount" was £1,000, now £2,000 (by Finance Act, 1944), this flat rate mostly applying to companies and concerns with the owner taking no active part in the business. But if there are "working proprietors" (that is, any who have been engaged full time in the management of the business for more than one-half of the relevant accounting period) the term "proprietor" includes a partner and, if a company, any director owning more than 5 per cent. of the share capital), £1,500 is allowed for each proprietor, plus £1,000 extra for one (Finance Act, 1944), £500 each extra where there are two, three, or four proprietors (£2,000 is the limit of this extra amount). Thus the full "minimum amount" for one proprietor has been £2,500, for two £4,000, for three £6,000, and for four £8,000. The Commissioners may increase the amount by a further sum if the size of and the nature of the firm warrants it, this not to exceed £1,000 for each proprietor or £4,000 altogether.

New Concessions

The Finance Act, 1945, now provides—these concessions applying to all the "standards" mentioned above, that if the amount which has applied as a "standard" is less than £12,000, this is to be increased by a sum equalling one-tenth of the difference between that sum and £12,000, the new amount to apply in relation to any chargeable accounting period beginning at or after the end of March, 1945. To show the working of this, take the "standard" for the pre-war basis having been £4,000, the difference to £12,000 is £8,000; one-tenth of that amount is £800, therefore the "standard" becomes £4,800 instead of £4,000 as formerly.

Here are the exemption limits, in a nutshell, as it were. Every taxpayer is now exempt from Excess Profits Tax up to £3,000 current profits, as the pre-war standard can be by "minimum amount" procedure, flat rate £2,000 plus £1,000, being one-tenth of the difference (£10,000) between £2,000 and £12,000, thus £3,000. Where the "working proprietor" procedure applies, the exemption limits now are £3,450 (from £2,500) for one proprietor, £4,800 (from £4,000) for two proprietors, £6,600 (from £6,000) for three, and £8,400 (from £8,000) for four proprietors.

HOME CONSUMPTION OF LEAD

Future applications to the Non-Ferrous Metals Control for licences to acquire lead for consumption in the United Kingdom will be considered by the Control without restrictions in respect of the type of article to be manufactured. In making this announcement the Ministry of Supply states that the statutory provisions regarding the acquisition and disposal of lead are still in force, but it is no longer necessary to submit schedules of Service or home civil orders with applications for licences for lead.

Instead, each application must be accompanied by the following signed statement:—"We certify that the quantity requested on the accompanying application is needed to cover orders for our products, and that in the case of applications for virgin metal full allowance has been made for our expected intake of scrap."

Certain restrictions on the release of lead for export remain in operation, and schedules of export order must continue to be submitted. Lead will, however, be released in future for the production of some additional classes of manufactured goods for export to all countries. Details are being communicated by the Board of Trade to the bodies concerned. All applications should, as previously, be submitted to the Non-Ferrous Metals Control, Grand Hotel, Rugby.

METALLURGICAL APPLICATIONS OF GRAPHITE

Detailing the metallurgical applications of graphite, an article in "Blast Furnace and Steel Plant" (June, 1945), just received, mentions riser rods. In a section covering graphite moulds, a case is cited of metal—both cast-iron and nickel chrome alloys—giving a life of 150 15-lb. ingots of copper or aluminium beryllium.

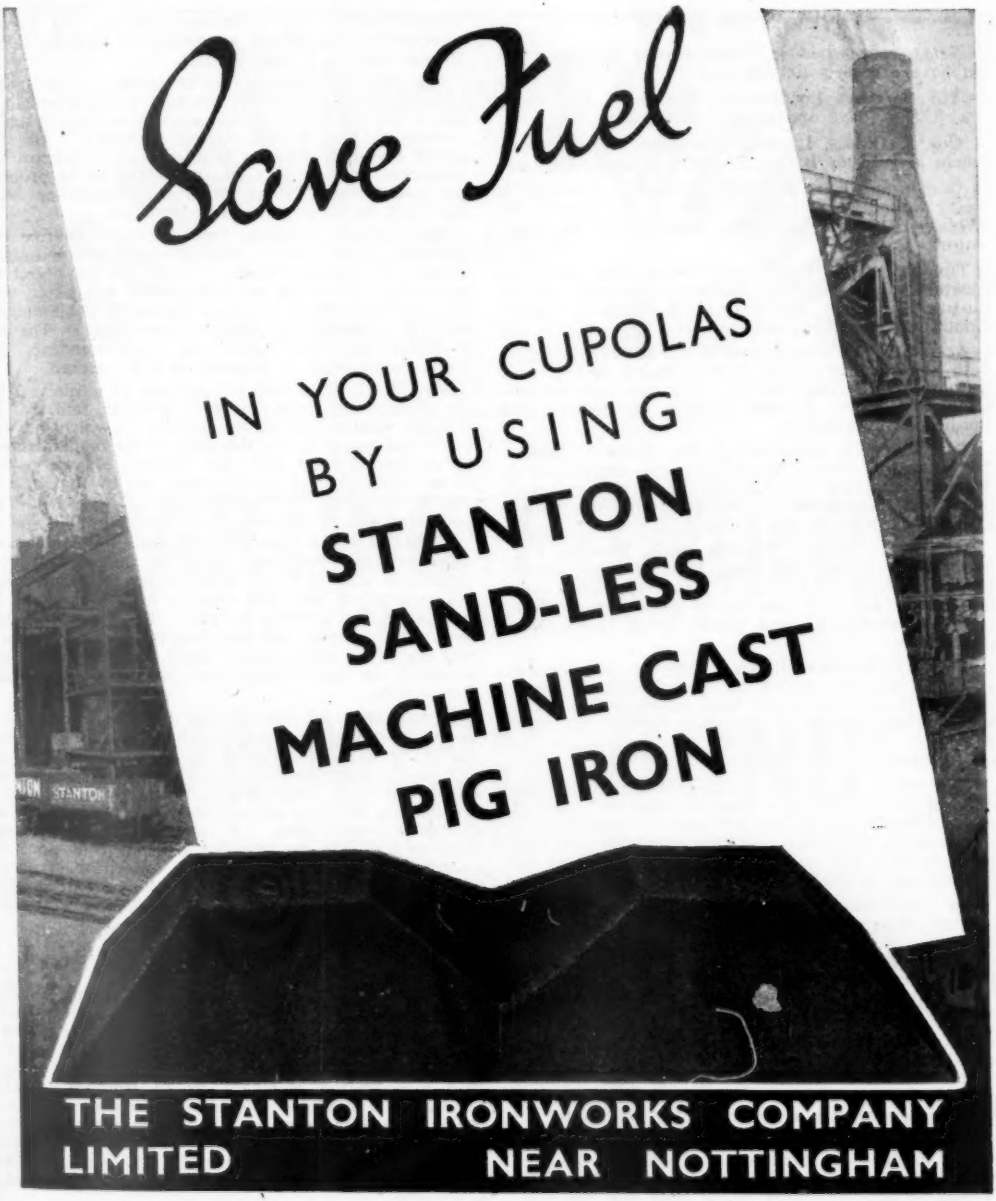
When superseded by graphite moulds, using no wash, an unfinished life of 4,300 ingots was registered. They are also recommended for taking care of "over metal" in ironfoundry casting bays.

AN INVESTIGATION OF THE CONSTITUTION OF CERTAIN FOUNDRY BONDING CLAYS

(*Continued from previous page.*)

of improving the clay from the refractory and possibly the plastic points of view by removal of the quartz; but how that could be done economically on a commercial scale he did not know. The quartz was extremely fine, and its removal necessitated the application of the finest elutriation system they could set up in the laboratory; at the present stage one could say that commercial methods of removing the quartz were out of the question, though there was no reason why they should be always.

Finally, Dr. Roberts expressed appreciation of the cordial reception which a somewhat academic Paper had received.


Save Fuel
IN YOUR CUPOLAS
BY USING
STANTON
SAND-LESS
MACHINE CAST
PIG IRON
THE STANTON IRONWORKS COMPANY
LIMITED NEAR NOTTINGHAM

NEWS IN BRIEF

STEEL PRODUCTION in France during May is stated to have exceeded 100,000 tons.

THE BALDWIN LOCOMOTIVE WORKS, of Eddystone, Pa., U.S.A., have opened up a Paris office.

COX & DANKS, LIMITED, announce that their new depot at Wadsley Bridge, Sheffield, is now completed.

GEOMETRIC TOOL & GAUGE COMPANY, LIMITED, is being wound up voluntarily. Mr. T. D. Turner, 176, Whitton Road, Twickenham, Middlesex, is the liquidator.

THE INDUSTRIAL DIAMONDS CONTROL has ceased to function. Both Sir Cecil Rodwell, Controller of Industrial Diamonds, and Mr. F. A. Mathias, Deputy Controller, have been released.

ACCORDING TO THE American Press, Ford is toying with the idea of an all-casting engine and is now seriously considering the use of a new type of cast aluminium piston, finished to shape by pressing and finished off by grinding.

THE PUBLIC EXAMINATION of Mr. Norman Godley, 215, Meadow Head, Sheffield, metal representative, formerly carrying on business as a manufacturer's agent, will take place on August 16 at the County Court Hall, Bank Street, Sheffield, 1.

MR. A. G. WHITE, 73, Cheapside, London, E.C., and Mr. F. T. WRIGHT, River Plate House, Finsbury Circus, London, E.C., have been appointed joint liquidators (with a Committee of Inspection) of Non-ferrous Founders, Limited, Garth Road, Lower Morden, Surrey.

ACCLES & POLLOCK, LIMITED, Oldbury, Birmingham, announce that the cold-rolled metal sections department of their business has been transferred to a subsidiary company, Metal Sections, Limited, as from August 6. This change is due to expansion in this side of their business.

THE FIRST of several Diesel locomotives being supplied by the Hunslet Engine Company, Limited, to Lofthouse Colliery, was sent underground recently. The loco. is of 50 h.p., weighs about 10 tons, and operates on a 3-ft. gauge track. It will be used for hauling coal in trucks of 4½ tons capacity.

THE DIRECTORS of W. G. Allen & Sons (Tipton), Limited, makers of pit tubs, light railway plant, etc., state that in view of the growth of the company's business some increase of capital will be necessary. They have the matter under consideration with a view to making an issue at a convenient date.

THREE BROTHERS, of Larbert, Stirlingshire, have a remarkable record of industrial service. James Samuel retired last year after 54 years at Torwood Foundry, Robert Samuel is completing his 50th year with the same firm, while a third brother has just completed 50 years' service with a firm of timber merchants.

THE OPENING DATE of the conference on the Unification of Engineering Standards has been fixed for September 24. In announcing the date, the Combined Production and Resources Board state that the conference will be held in Ottawa, Canada, and will be attended by delegations appointed by Canada, Great Britain and the United States.

MR. MICHAEL DEWAR, the chairman, at the annual general meeting of British Timken, Limited, remarked that it was impossible to manufacture any war machine without the use of anti-friction bearings. He suggested that probably the simplest way to control the armament industry in Germany would be to prohibit the manufacture in that country of anti-friction bearings, and to insist on their importation.

BIRMABRIGHT, LIMITED, have opened a marine department at the London offices of the Birmid Industries group—20, Berkeley Square, W.1—with the object of providing information and assistance to naval architects and marine engineers who are interested in aluminium alloy as a material for marine construction. The department will be under the superintendence of Lieut.-Commander F. Merrett, R.N.R., retired.

MR. H. H. BERRESFORD, speaking at a meeting of the Staffordshire Iron and Steel Institute, said that in bringing industry out of the position in which the war years had put it, it was the duty of the manufacturers to co-operate fully with the workers. It was going to be a difficult doctrine to preach, but by some means the workers had to be shown that they could not get more out of the pool than they put into it.

ENFIELD CABLES, LIMITED, of Brimsdown, Middlesex, announce their intention to establish in the Nantyglo-Brynmawr area of South Wales a new manufacturing plant, to which they will transfer from Brimsdown a portion of their growing business. The factory will be designed to employ not less than 600 people in what was one of the most hard-hit areas of the South Wales coalfield, on the borders of Monmouthshire and Breconshire.

IT HAS BEEN ANNOUNCED that extensive modernisation, amounting, it is said, to about £2 million, is to be carried out at the Round Oak Steelworks, Brierley Hill, under the five-year plan announced recently by the British Iron and Steel Federation. All existing melting furnaces will be scrapped in favour of a completely new shop. A new electrically driven cogging mill will be installed and electrification of existing mills will be undertaken. When these plans are completed it is expected that the output of the works will be substantially increased, and desirable economies achieved.

EIRE SCRAP-IRON ORDER

An Emergency Powers (Cast-iron Scrap) Order, issued by the Eire Minister for Supplies, taking effect from August 1, fixes maximum prices for cast-iron scrap as follows:—(*a*) When sold by a scrap-iron merchant, £6 5s. per ton; (*b*) when sold by a person other than a scrap-iron merchant to an ironfoundry, £5 per ton. The Order prohibits an ironfoundry purchasing cast-iron scrap at a price exceeding whichever of the above prices is appropriate. The prices are "on site," except when the scrap is located in the same town as the foundry when they are "delivered to foundry."

BONDED "SHALAGO" BLACKING

PREPARED

READY TO MIX WITH WATER

GREY

PARTING POWDER

NON-SILICA

CUMMING BOND

SAND REVIVER

WM. CUMMING & CO.

LIMITED

GLASGOW, FALKIRK, CHESTERFIELD,
DEEPFIELDS Nr. BILSTON, MIDDLESBROUGH

PERSONAL

MR. ROBERT JOHN HALL has been appointed a director of British Insulated Callender's Cables, Limited.

MR. HARRY HUNTER has been appointed an additional director of Richardsons Westgarth & Company, Limited.

MR. JOHN MUIR and MR. JAMES F. INSCH have joined the board of the Scottish Stamping & Engineering Company, Limited.

MR. JAMES MCWATERS STOREY has been appointed managing director of Dewrance & Company, Limited, engineers, Great Dover Street, London, S.E.1.

MR. G. WESLEY AUSTIN, M.Sc., has been elected to the Goldsmith's Chair of Metallurgy at Cambridge University. He replaces DR. R. S. HUTTON, who retires on October 1.

MR. A. A. M. DURRANT has been released from his appointment as Director of Tank Design in the Ministry of Supply. He has been succeeded by MR. A. E. MASTERS.

MR. C. S. GILL, director and general manager of Davy & United Roll Foundry, Limited, Billingham, has been appointed managing director, and MR. J. S. HAMPTON and MR. S. LEETCH have been made directors of the company.

MR. O. W. ELLIS, a graduate of Birmingham University, has been elected chairman of the Metallurgy Division of the Canadian Institute of Mining and Metallurgy. He is director of the engineering and metallurgical department of the Ontario Research Foundation.

SIR G. TRISTRAM EDWARDS has been appointed managing director of Smith's Dock Company, Limited, North Shields, in succession to Mr. L. E. Smith, who retires next month. LIEUT.-COL. T. E. SMITH has been appointed assistant managing director at the South Bank, Middlesbrough, yard.

MR. A. P. QUARRELL, who was appointed a director of British Oil Engines (Export), Limited, on its formation in March last, has now taken up his duties with this company. He has relinquished his appointment as the London manager of the Brush Electrical Engineering Company, Limited.

DR. C. R. AUSTIN, professor of metallurgy at Pennsylvania State University, has been appointed assistant to the president (Mr. Oliver Smalley, O.B.E.), Meehanite Metal Corporation, New Rochelle, N.Y. Dr. Austin is a Fellow of the Royal Institute of Chemistry and at one time was on the staff of the National Physical Laboratory.

MR. H. NUTTALL has been released by the Minister of Supply from his appointment as Director of Wood Working Machinery in the Machine Tool Control. His services will continue to be available in an advisory capacity. MR. E. CATLEY, at present Assistant Director of Wood Working Machinery, will be in charge of this branch as Deputy Director.

MR. HARRY SKEET BROOM, managing director and founder of Broom & Wade, Limited, High Wycombe, Bucks, makers of air compressors and pneumatic tools, celebrated his 70th birthday recently. To mark the occasion he received a presentation from the employees of the company. Mr. Broom is well known as a pioneer of compressed air engineering.

MR. D. MACARTHUR has been appointed general sales manager of the Metropolitan-Vickers Electrical Company, Limited. He is a director of the company. MR. W. A. COATES, while retaining his position of sales manager of the switchgear department, has been appointed assistant to the general sales manager. MR. G. W. G. CANTER has been appointed manager of the marine and special contracts department.

MR. G. M. CAMPBELL has relinquished the position of director of manufacture of the British Thomson-Houston Company, Limited, but remains on the board as adviser to the managing director (Mr. H. Warren). MR. W. W. VINSEN, assistant director of manufacture, has been appointed director of manufacture; and MR. H. J. ARMSTRONG has been appointed manager of the Coventry works, in succession to Mr. Vinsen. MR. E. H. BALL, assistant sales director, has relinquished the managership of the transformer sales department, to which position MR. L. G. AXE has been appointed. Mr. Axe graduated in electrical engineering at Bristol University, and served his apprenticeship with the B.T.-H. Company. During the war he has been superintendent of the B.T.-H. transformer factory at Rugby.

WORKERS AND THE GOVERNMENT

A memorandum which the Executive Committee of the Amalgamated Engineering Union has sent to its branches expresses the opinion that many managements will be willing enough to co-operate with the Labour Government and with the organised workers in securing full production, the best use of resources, and higher living standards. A great opportunity presents itself to develop and expand the principles of joint consultation on production matters which helped to win the war. The members of the union are told that jobs, homes, security will not fall into their laps. It will not be possible to sit back and "leave it to the Government." Temporary inconveniences may be as necessary as during the struggle for full war output. Some members may not for a time be able to do precisely the job they prefer. Henceforward all have heavy responsibilities as well as greater rights and prospects.

THE U.S. STEEL CORPORATION are brightening up their shareholders' meetings by illustrating their balance sheets and operating results with a cinema film.

THE SPARROWS POINT PLANT of the Bethlehem Steel Company have discarded the standard thimble method of determining the quantity of dust in blast-furnace gas and are now using the sugar method.

BECAUSE THERE ARE 75,000 reportable eye injuries annually in American industry, Battelle Memorial Institute is undertaking a research to obtain information to be placed at the disposal of safety goggle makers and other interested parties with a view to the material reduction of this figure.

Design by Victor Reinganum

MOSAICS OF STEEL

NUMBER SIX

At the Appleby-Frodingham plant in Lincolnshire there exists a combination of circumstances particularly favourable to the production of structural steels—ores inexpensively mined and adjacent to the furnaces and to the coalfields. In the most modern plants in the country these are smelted and rolled into all manner of steel sections to serve the structural needs of the community. The age of reconstruction will be founded on steel because it is readily available in a multiplicity of forms for architectural design, civil and mechanical engineering and shipbuilding. Despite many new materials, such as the light non-ferrous metals and plastics, steel will remain the basic constructional material where strength and lasting properties are essential.

THE UNITED STEEL COMPANIES LTD

THE UNITED STEEL COMPANIES LIMITED

17 WESTBOURNE ROAD · SHEFFIELD 10 · ENGLAND

STEEL, PEECH & TOZER, SHEFFIELD
SAMUEL FOX & CO. LTD., SHEFFIELD
UNITED STRIP & BAR MILLS, SHEFFIELD

APPLEBY-FRODINGHAM STEEL CO. LTD., SCUNTHORPE
WORKINGTON IRON & STEEL CO., WORKINGTON
UNITED COKE & CHEMICALS CO. LTD., CUMBERLAND

THE ROTHERVALE COLLIERIES, TREETON
THE SHEFFIELD COAL CO. LTD., TREETON
THOS. BUTLIN & CO., WELLINGBOROUGH

USP.50

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"ATRU"—Steel. HATTERSLEY & RIDGE, LIMITED, Club Mill Road, Sheffield, 6.

"BIGWOOD"—Metal-working machines. JOSHUA BIGWOOD & SON, LIMITED, Wednesfield Road, Wolverhampton.

"ECOFIX"—Common metal or metal alloys, in strip form. ECOFIX, LIMITED, Areolex Works, Bridge Road, Camberley.

"NUFFIELD"—Articles of common metal or of common metal alloys. MORRIS MOTORS, LIMITED, Cowley, Oxford.

"NIBRON"—Filler rods for use in welding. ENFIELD ROLLING MILLS, LIMITED, Millmarsh Lane, Brimsdown, Enfield, Middlesex.

"ATOMIXE"—Air compressors, hydraulic machinery, spraying machines, etc. ATOMIXE, LIMITED, 3, Bridge Road, Sutton, Surrey.

"NINA" AND "NINABRIGHT"—Metals and alloys. HARDING, RHODES & COMPANY, LIMITED, Tower Works, Globe Road, Leeds, 11.

"VINERTIA"—Alloys not of precious metal. DELORO SMELTING & REFINING COMPANY, LIMITED, Highlands Road, Shirley, Birmingham.

"CERA"—Alumina for use in manufactures. BRITISH ALUMINIUM COMPANY, LIMITED, Salisbury House, London Wall, London, E.C.2.

"DELFER"—Metal alloys, welding rods and electrodes. DELORO SMELTING & REFINING COMPANY, LIMITED, Highlands Road, Shirley, Birmingham.

"CALMOLITE" AND "CALSIMOL"—Molybdenum and alloys thereof. MINWORTH METALS, LIMITED, Forge Lane, Kingsbury Road, Minworth, Birmingham.

"HEATILATOR"—Fireplaces with or without air circulating devices. HEATILATOR, INC., c/o Marks & Clerk, 57-8, Lincoln's Inn Fields, London, W.C.2.

"SIMOLITE"—Silicon-molybdenum oxides for use in the manufacture of steel. MINWORTH METALS, LIMITED, Forge Lane, Kingsbury Road, Minworth, Birmingham.

"WIDDEX"—Mining, quarrying, textile, foundry and agricultural machines, etc. WOODHOUSE & MITCHELL, LIMITED, Clifton Bridge Works, Wakefield Road, Brighouse, Yorks.

"WALTERISED"—Partly wrought common metals, and goods manufactured from common metal. WALTERISATION COMPANY, LIMITED, Waddon Marsh Way, Purley Way, Croydon.

"DURITAS"—Tungsten carbide common metal alloys and hand tools comprised of or faced with cemented carbide. WILLIAM JESSOP & SONS, LIMITED, Brightside Works, Brightside, Sheffield, 1.

"ARCHIMEDES"—Electric motors, internal combustion engines, valves, pressure regulators, toothed gearing, gear boxes, sawing machines, etc. AKTIEBOLAGET ARCHIMEDES, c/o F. Watson, Aldwych House, Aldwych, London, W.C.2.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

H.R.T. (Engineers), 21, Morrish Road, London, S.W.2—£500. H. R. Thomas and E. I. Godfrey.

Faymus Engineering Products, 2, Dennis Parade, London, N.14—£1,000. T. A., G., and J. W. Fay.

Kensington Engineering—£3,000. P. Nadin, Edgefields, Stockton Brook, Stoke-on-Trent, P. Nadin, jun., and W. Nadin.

Michael Carr, Willis Road, Whitehorse Road, Croydon—Engineers, etc. £1,000. A. Curwin, E. Starling and F. D. Ellis.

Ace Welding, Sheet Metal & Boiler Company—£500. M. M. Hunter, 131, Kenmore Avenue, Kenton, Middlesex, subscriber.

Fuel Furnaces, Daimler House, Paradise Street, Birmingham—£8,000. A. J. F. Bawden, G. W. Platt, J. H. Harris and K. F. Goodall.

Altus Engineering Company (Corsham), 3, Stokes Road, Corsham, Wilts.—£12,000. A. V. Brown, E. P. H. Jones, and M. H. Stuart.

Tipton & Morley, 2, Horsemarket, Barnard Castle, Co. Durham—Dairy and agricultural engineers, etc. £5,000. S. E. Tipton and C. S. Morley.

Dulson Associated Products, National Provincial Bank Chambers, High Street, Dudley—Manufacturers of engineering products, etc. £1,000. A. W. and L. B. Dulson.

Cubbon & MacMillan, 82, Victoria Street, London, S.W.1—To take over an engineering business carried on by J. F. Cubbon. £500. J. MacMillan and M. C. Cubbon.

OBITUARY

MR. HARRIS REID, who was secretary of Smith's Dock Company, Limited, from 1930 to 1935, when he retired, died recently, aged 76.

MR. SIDNEY WILFRED FRANCIS, managing director of F. Francis & Sons, Limited, sheet metal workers, of London, S.E., died on August 3 at his home at Buxted, Sussex.

MR. HUGH MAXWELL BROWN, who was Scottish representative of C. A. Parsons & Company, Limited, steam turbine engineers, with whom he served his apprenticeship, has died, aged 67.

MR. WILLIAM BACON died recently, at his home at Hatch End, Middlesex, in his 69th year. He was director and general manager of Keith Blackman, Limited, with whom he served for nearly 53 years.

MR. FRANK ROBINSON, for 23 years manager of the heating department of Manley & Regulus, Limited, plumbers' and engineers' brassfounders, of Wolverhampton, has died suddenly. He was a director of the firm.

MR. JOHN MCKENZIE, export manager of Stewarts and Lloyds, Limited, Glasgow, died in Glasgow Royal Infirmary. He was taken ill while travelling home to Prestwick from a business trip in the South. He was 60 years of age.

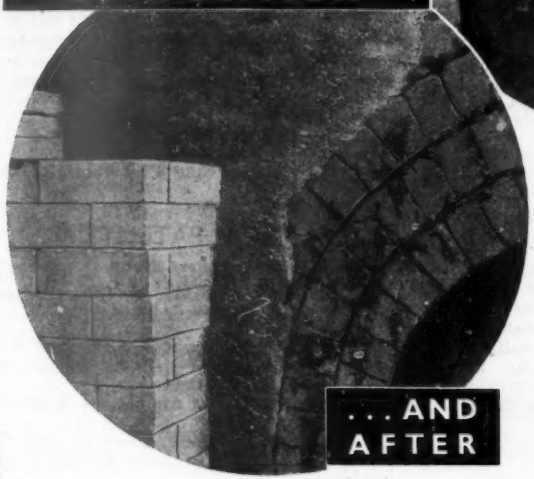
Patch

WORN FURNACE BRICKWORK WITH

Durax No. 1

PLASTIC FIREBRICK COMPOSITION

BEFORE



...AND AFTER

WHEN quick repairs to worn furnace brickwork are required, Durax No. 1 provides an excellent patching medium. It is supplied in a stiff, plastic condition ready for use. It possesses exceptionally high refractoriness, negligible shrinkage on drying, and good resistance to thermal shock.

Durax No. 1 is also frequently used as a rammed monolithic lining in small size furnaces, such as crucible furnaces, owing to the ease of installation — the avoidance of special shapes—and because it provides a strong, durable structure. Users who require further information concerning the uses of Durax No. 1 should communicate with the G.R. Technical Department.

General Refractories LIMITED

GENEFAX HOUSE, SHEFFIELD, 10

TELEPHONE: 31113 (6 LINES)

FIREBRICKS · BASIC BRICKS · ACID-PROOF MATERIALS · CEMENTS

PLASTICS · INSULATION · SILICA BRICKS · SILLIMANITE · SANDS

Raw Material Markets

IRON AND STEEL

The number of furnaces in blast has not varied for some time past, but pig-iron production has to some extent been accelerated by the more liberal distribution of high-grade ores. Engineering foundries are able to obtain low-phosphorus or hematite iron in adequate quantities, but careful supervision of the licences for high-phosphorus iron is still necessary to make sure that there is no interruption of operations at the light foundries. In the war period there were ample reserves of foundry iron, but now that the housing drive has begun there is a mounting call for light castings, and most of the foundries are working on very slender stocks.

Special efforts have been made of late to step up the output of sheet bars, and the sheet mills have thereby been unable to attain an almost unprecedented production of light sheets, which are needed for high-priority purposes at home and abroad. This concentration of effort on the manufacture of bars has, however, created a shortage of small billets, which has occasioned some anxiety among re-rollers, who are keener than ever to acquire either primes or defective material pending the arrival of further supplies which the Control are reported to have purchased from the Dominions.

Orders for sections can still be placed for reasonably early delivery, but most of the mills have good rolling programmes. Within the limits of steelworks capacity, substantial export orders have been booked for plates, joists and sections, and shipbuilders are very freely issuing specifications for plates and angles.

The pressure for steel sheets and wire is fully maintained, while collieries are taking up substantial tonnages of arches, props, and bars. The call for railway material, both for home use and for the restoration of European transport, promises to provide full employment for the rail mills for a long period ahead.

NON-FERROUS METALS

The Non-ferrous Metals Control has announced that in future applications for licences to acquire lead for use in the United Kingdom will be considered without restrictions as to the type of article to be manufactured, This is a further step along the road to the complete liberation of the non-ferrous metals trade from the shackles of wartime restrictions. It is still true, however, that the labour supply at the factories, rather than inability to secure licences for metal, restricts consumption to comparatively narrow limits. There appears to be no great difficulty at the moment in meeting all the calls made for copper, lead and zinc, whatever the position would be if manufacturing firms could command all the labour they want. Tin, of course, is in another category, and it is reported that the United States Government, concerned at the situation ahead, has sent representatives to London to confer with British and Dutch officials.

DEATH OF SIR ALLAN MACDIARMID

Sir Allan Campbell Macdiarmid, president of the British Iron and Steel Federation, died on Tuesday last within a few days of his 65th birthday. He was knighted in the last New Year Honours List. He qualified as a chartered accountant and joined Stewarts and Lloyds, Limited, as secretary in 1909. At the time of his death he was chairman and managing director of that company. Sir Allan was on the board of some 30 companies. He was chairman of Clydeside Tube Company, Limited, Cochranes (Middlesbro') Foundry, Limited, Holwell Iron Company, Limited, Islip Iron Company, Limited, James Pain, Limited, James Russell & Sons, Limited, John Spencer, Limited, Lloyds Ironstone Company, Limited, New Crown Forgings, Limited, Newport & South Wales Tube Company, Limited, Prothero Steel Tube Company, Limited, Scottish Tube Company, Limited, Stanton Ironworks Company, Limited, Tubewrights, Limited, United Tube (Holdings), Limited, and the Wellingboro' Iron Company, Limited.

Sir Allan Macdiarmid was also on the boards of Bowne & Shaw, Limited, the British Iron and Steel Corporation, Lancashire & Corby Steel Manufacturing Company, Limited, Lancashire & Corby Steel Selling Company, Limited, Oxfordshire Ironstone Company, Limited, Richard Thomas & Baldwins, Limited, Stewarts and Lloyds of South Africa, Limited, Tube Investment, Limited, and the United Steel Companies, Limited.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

569,164 SHAW, N., NELSON, G., and EASTEN, R. Casting of bombs, etc., and the manufacture of permanent moulds therefor.

569,180 AINSWORTH, A. Continuous heat-treatment ovens.

569,326 E. M. B. COMPANY, LIMITED, and CATLIN, L. A. Die-casting injection moulding and like machines.

569,338 BOLTON & SONS, LIMITED, T., and DOLPHIN, H. E. Electrolytic refining of copper.

569,342 BENGOUGH, G. D., WORMWELL, F., YARDLEY, V. A., and NURSE, T. J. Apparatus for testing the corrosion resistance and durability of metals, metallic coatings, etc.

569,349 FEUER, E. Lead base alloy for bearings.

569,368 MOND, A. L. (Universal Oil Products Company). Process of and apparatus for effecting reactions alternately under metal-reducing and carbon-forming conditions and under metal-oxidizing conditions.

569,393 GALLUSSER, H. Electrically heated drum furnaces.

569,408 AMERICAN BRASS COMPANY. Heat-treatable copper alloys.

569,422 UDY, M. J. Compositions and methods for producing sound metal castings.